

TABLE 2.—Free-air resultant winds (m. p. s.) during January, 1928

Altitude (meters) m. s. l.	Broken Arrow, Okla. (233 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				Washington, D. C. (34 meters)			
	Mean		10-year mean		Mean		7-year mean		Mean		11-year mean		Mean		10-year mean		Mean		10-year mean		Mean		8-year mean	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface	S. 43 W.	2.0	S. 48 W.	1.2	S. 87 W.	3.7	N. 78 W.	1.5	N. 72 W.	5.0	N. 65 W.	3.1	S. 20 W.	1.5	W.	0.5	S. 67 W.	4.6	S. 54 W.	2.2	N. 71 W.	2.0	N. 42 W.	1.5
250	S. 42 W.	2.3	S. 43 W.	1.3	S. 86 W.	4.1	N. 83 W.	1.7	N. 68 W.	6.1	N. 69 W.	3.7	S. 18 W.	2.5	S. 81 W.	0.7	S. 64 W.	5.2	S. 53 W.	2.6	N. 81 W.	6.1	N. 69 W.	3.7
500	S. 50 W.	4.7	S. 39 W.	2.6	S. 86 W.	6.9	S. 88 W.	3.2	N. 57 W.	9.3	N. 65 W.	5.8	S. 37 W.	3.4	S. 66 W.	1.9	S. 68 W.	9.8	S. 61 W.	5.4	N. 81 W.	8.0	N. 73 W.	6.1
750	S. 61 W.	5.4	S. 45 W.	3.2	S. 86 W.	9.1	S. 85 W.	4.8	N. 41 W.	4.4	S. 61 W.	7.0	S. 43 W.	4.1	S. 57 W.	3.0	S. 80 W.	12.3	S. 70 W.	7.1	N. 79 W.	9.4	N. 72 W.	7.8
1,000	S. 77 W.	6.0	S. 61 W.	3.9	S. 86 W.	10.1	S. 83 W.	6.1	N. 56 W.	10.4	N. 63 W.	5.8	S. 41 W.	4.4	S. 61 W.	3.7	S. 88 W.	12.8	S. 78 W.	8.1	N. 78 W.	10.4	N. 69 W.	8.1
1,250	S. 80 W.	6.3	S. 72 W.	4.4	N. 89 W.	11.8	S. 83 W.	8.0	N. 53 W.	11.1	N. 62 W.	8.0	S. 51 W.	5.2	S. 68 W.	4.5	N. 88 W.	13.5	S. 83 W.	9.1	N. 76 W.	12.5	N. 70 W.	10.5
1,500	S. 83 W.	7.3	S. 75 W.	5.5	N. 88 W.	13.3	S. 83 W.	10.5	N. 57 W.	12.1	N. 63 W.	8.5	S. 55 W.	7.3	S. 71 W.	6.0	N. 88 W.	14.3	S. 86 W.	10.3	N. 78 W.	13.8	N. 73 W.	11.8
2,000	N. 89 W.	9.7	S. 84 W.	7.6	N. 84 W.	14.1	S. 89 W.	12.8	N. 54 W.	14.4	N. 64 W.	11.1	S. 67 W.	7.6	S. 78 W.	7.2	N. 87 W.	16.7	S. 86 W.	10.3	N. 78 W.	13.8	N. 73 W.	11.8
2,500	N. 72 W.	10.9	W.	9.0	N. 87 W.	14.4	W.	15.1	N. 55 W.	15.8	N. 65 W.	13.1	S. 66 W.	8.0	S. 80 W.	8.5	S. 88 W.	17.8	W.	14.2	N. 78 W.	16.0	N. 80 W.	14.2
3,000	N. 67 W.	10.7	N. 87 W.	10.2	N. 85 W.	15.6	S. 83 W.	16.4	N. 49 W.	17.0	N. 65 W.	14.6	S. 74 W.	8.9	S. 81 W.	9.9	N. 83 W.	17.6	W.	14.2	N. 78 W.	18.5	N. 81 W.	15.4
3,500	N. 66 W.	11.0	N. 84 W.	10.9	N. 84 W.	17.2	S. 86 W.	16.3	N. 48 W.	18.4	N. 66 W.	15.6	S. 82 W.	10.4	S. 83 W.	11.2	N. 72 W.	15.1	S. 85 W.	13.4	N. 71 W.	15.0	N. 78 W.	17.0
4,000	N. 62 W.	9.2	N. 83 W.	10.9	N. 70 W.	14.9	S. 87 W.	15.5	N. 35 W.	18.0	N. 62 W.	18.9	N. 88 W.	10.2	S. 74 W.	12.1	N. 57 W.	13.7	S. 81 W.	15.9	N. 79 W.	17.0	N. 82 W.	18.2
4,500	N. 22 W.	12.0	N. 85 W.	10.6	N. 45 W.	15.0	N. 73 W.	14.6	N. 22 W.	18.0	N. 54 W.	19.0	W.	13.0	S. 74 W.	14.2	N. 69 W.	17.2	S. 88 W.	18.4	N. 76 W.	19.3	N. 77 W.	17.3
5,000					N. 45 W.	13.0	N. 54 W.	16.2									N. 45 W.	23.0	N. 45 W.	23.0	N. 74 W.	19.2	N. 81 W.	19.3

THE WEATHER ELEMENTS

By P. C. DAY

GENERAL CONDITIONS

The important features of the weather during January, 1928, were the strong cold wave existing during the first few days over the districts from the plateau region eastward, and the widespread deficiency in the amounts of precipitation as compared with the normals for the month over practically all parts of the country.

PRESSURE AND WINDS

As the month opened a strong anticyclone, attended by severe cold, that had entered the northwestern United States near the close of 1927 had advanced into the Great Plains with center of highest pressure, nearly 31 inches, over the Dakotas and eastern Montana. At the same time a cyclone of considerable importance was passing down the St. Lawrence Valley, and conditions favored clear and cold weather over the entire country from the Rocky Mountains eastward.

As the anticyclone moved eastward and southward during the following day or two sharp changes to colder weather occurred, the falls from 8 a. m., December 31, to 8 a. m., January 1, ranging from 20° to 50° or more over a wide area from the Middle and East Gulf and South Atlantic States northward to the Ohio Valley and lower Lake region, the surface temperatures at the same time ranging from nearly 50° below zero in Montana to 60° above in southern Florida.

During the following day or two the anticyclone gradually extended southeastward, and temperatures continued to fall over the Gulf and South Atlantic States, the severest cold over portions of southern Florida occurring on the mornings of the 3d and 4th, at which times temperatures below freezing extended into and even south of the Everglades.

While the extreme low temperatures in Florida and near-by areas during this period were slightly higher than on some other occasions, still the effect of the cold was greatly augmented by the long periods during which the temperature continued constantly below the freezing point. In some instances this covered a greater number of hours than was the case during the severe cold of February, 1899.

Though unusual cold prevailed at this time over much of the far Northwest and in the more southern districts from the Great Plains eastward, the cold was not unusually severe over the northeastern districts.

A prompt rise in temperature followed the anticyclone referred to above, and moderate winter weather prevailed over most districts until the middle of the month, some unusually high temperatures for midwinter occurring in the lower Missouri and middle Mississippi Valleys about the 10th.

No important cyclone crossed the country during the first half of the month, though considerable precipitation occurred near the end of the first decade over the Southeastern and Atlantic Coast States, and about the 14th and 15th from the upper Mississippi Valley eastward to New England.

A sharp fall in temperature occurred over the more northern States from the Dakotas eastward on the 15th and 16th, but warmer weather quickly followed, continuing until the end of the second decade, when an important anticyclone again entered the Northwest and quickly overspread the country from the Rocky Mountains eastward, bringing sharp falls in temperature and carrying the frost line again into the coast districts of the East Gulf and South Atlantic States. Slightly preceding this cold wave a cyclone of moderate strength moved from the middle Plains to the upper Lake region and thence to the St. Lawrence Valley, causing during the 19th and 20th rather widespread, but mostly light precipitation from the Mississippi Valley eastward.

The early part of the third decade was without important weather changes, though on the 24th a well-defined cyclone was central near southern Missouri, which moved rapidly to the northeastward and was central on the morning of the 25th as a storm of considerable severity over northern New England. It was attended by widespread and moderately heavy precipitation from the Mississippi River eastward, mostly rain, though some snow occurred in the Ohio Valley and Great Lakes region.

An important anticyclone developed over the middle plateau on the morning of the 27th and gradually moved southeastward, reaching the vicinity of Florida on the morning of the 29th, when unusually low temperatures occurred over the southern portions of that State. While temperatures over the Southeastern States were mainly considerably higher at this time than occurred during the cold wave earlier in the month, yet in the more southern portions of Florida the minimum temperatures on the 29th in the districts to the southeast of Lake Okeechobee were from 3° to 5° or more lower than on the previous occasion. Concerning these conditions, the official in charge at Jacksonville states that some of the

fall in temperature was due to strong radiation rather than to the translation of cold from more northern locations.

While unusual cold existed over the Southeastern States as a result of the anticyclone covering that region about the 29th, temperatures in other portions of the country were not markedly low, and at the close moderate winter temperatures were again the rule.

The average pressure for the month was materially above normal over all southern, central, and northwestern districts, and below from the central Canadian Provinces southeastward and eastward to the Atlantic coast. These details, together with the changes in the average barometric pressures from December to January, are shown on the insets of Charts II and III.

The winds were mainly southerly from the Mississippi River eastward, from the south over the middle and southern Plains, and variable elsewhere. High winds were infrequent and damage therefrom was small save in the vicinities of Cincinnati, Ohio, and Louisville, Ky., where, on the 19th, tornadic winds caused material damage. The usual details concerning storms appear in the table at the end of this section.

TEMPERATURE

The average monthly temperatures were above normal over the entire United States and Canada also, as far as records disclose, save in small areas along the South Atlantic and Gulf coasts and locally at a few points elsewhere. In the central valleys and more northern districts the excesses ranged from 5° to 10°, and in the Canadian Northwest they were materially larger. It was also distinctly warm in the far Southwest, Los Angeles, Calif., reporting the month as the warmest January of record.

The warmest periods were mainly near the middle of the month, though in New England the warmest day was the 1st and in some portions of the plateau the 5th and 6th were the warmest.

The coldest period for most districts was near the 1st of the month, though in the plateau and portions of the Pacific Coast States the lowest temperatures occurred about the 17th to 19th, while in the upper Lake region and over the Middle Atlantic States the 29th and 30th were the coldest days.

Much damage to winter truck occurred in the Gulf and South Atlantic coast districts, and considerable damage to citrus fruits is reported in the eastern areas where these are grown.

PRECIPITATION

January was a notably dry month, and days with rain or snow were infrequent in nearly all portions. While in only a few localities were the monthly amounts less than have previously occurred in this month, yet the deficiency was probably the most general and widespread ever known. Among more than 200 regular Weather Bureau stations well distributed over the country reporting precipitation, less than 5 per cent had amounts in excess of the monthly normals. Like conditions prevailed over the adjoining portions of western Canada, but in the Maritime Provinces of that country there appears to have been a moderate but general excess.

Atmospheric pressure conditions were favorable for a dry month along the Pacific coast, though January is usually the month of maximum precipitation in this area. Due to the presence of anticyclonic conditions which prevailed over the plateau region no cyclones entered the United States from the Pacific coast during the entire first half of the month, and only occasionally during the latter half were conditions more favorable for such movement.

In other parts of the country there was a notable absence of the storms usual to winter, this being particularly the case over the Gulf and South Atlantic States, where generally the amounts of precipitation were only small percentages of the usual January falls.

SNOWFALL

While snow occurred as usual over the greater part of the country, the amounts were nearly everywhere much less than usually fall in the midwinter month, and in portions of the Central States in particular the depths of fall were among the least of record for January.

The most important snowstorm of the month, though limited to a small area, occurred on the 28th and 29th, when unusually heavy snow began during the early part of the 28th over the northeastern portions of Virginia and extended during the day into Maryland, eastern Pennsylvania, and New Jersey, with total falls ranging up to 30 inches in some north-central Maryland sections. During the following day the storm area extended northward to southern New England and westward into the lower Lakes and upper Ohio Valley, but with lessened severity. Over portions of the New Jersey coast the fall was the heaviest of record in any January.

In the western mountains the snowfall was mainly less than normal, and the amounts stored at the high elevations supplying some important irrigation and water-power projects were discouragingly small.